Designer's Check List for Prestressed Concrete

Design	Reference/Commentary
Prestressing Force:	
An estimate of prestress force required can be made from charts in Section 11 of the *Bridge Design Aids* (BDA) manual.	*Bridge Design Aids*, Section 11
Call for P_{jack} at anchorages for cast-in-place structures.	
Call for P_f at centerline of span for precast units	Give precastor flexibility in strand layout
One-end stressing of post-tensioned structures:	
Stress simple spans from either end.	
All two-span post-tensioned structures shall be designed for stressing from the long-span end only. Use the following note on the plans:	
"One-end stressing shall be performed from the long-span end."	
Multi-span structures and structures involving hinges should be checked for one-end stressing. One-end stressing is considered economical when the increase in P_{jack} does not exceed 3 percent. If one-end stressing is permitted, the plans must show the location where one-end stressing is to be performed.	Based on studies conducted in 1971

Supersedes Memo to Designers 11-3 dated August 1989

	Reference/Commentary
Loss of Prestress:	
The effect of horizontal curvature is to be considered when determining prestress losses.	Memo to Designers 11-30
Losses other than friction: See *Bridge Design Specifications*, Table 9.16.2.2.	Memo to Designers 11-8; *Standard Specifications* 50-1.08; *Bridge Design Specifications*, Table 9.16.2.2
Concrete Strength:	
For post-tensioning, minimum f'_c is 4,000 psi and minimum f'_{ci} is 3,500 psi.	
For pretensioning, minimum f'_c or f'_{ci} is 4,000 psi.	Memo to Designers 11-8
For cast-in-place construction, show required f'_c to the nearest 500 psi for strengths to 5,500 psi and to the nearest 100 psi for higher strengths. Show f'_{ci} to the nearest 100 psi for all strengths.	
Miscellaneous:	
Flare exterior girders to 18" minimum at anchorages.	
The flare length of 16' and #4 duct ties shown on Standard Plan B8-5 are the minimum values to be used. We have had several unsatisfactory experiences with details that incorporated shorter flares and duct ties of a different configuration.	
Reinforce ends of anchorage diaphragms for bursting forces.	
Consider effects of lateral tendon force on horizontally curved prestressed structures.	Memo to Designers 11-31
Use a factor of three (3) for effects of creep when determining camber for cast-in-place box girder structures.	
Refer to Memo to Designers 11-34 for cambering hinge spans.	Memo to Designers 11-34

Miscellaneous, *continued*	Reference/Commentary
Consider effects of end rotation at end of long span precast girders.	Account for semi-rigid connection due to prior pouring of intermediate and end diaphragms
Provide for shortening during stressing. Use greased sheet metal on top of elastomeric pads.	Memo to Designers 7-1
Since prestressed structures continue to shorten, use less than conventional thickness of expansion joint filler.	
Keep C.G. at anchorages as low as possible to avoid conflict with the joint seal installation. If possible, and it usually is, show a ±6" tolerance for the C.G. at the anchorages.	
Check for special design requirements for SPT Co. railroad structures.	Memo to Designers 17-120
Prestressing duct patterns for SPT Co.	Memo to Designers 17-140
Detailing	
#8 bars are used in top of web as in reinforced box.	Std. Plan B7-1 "Buck Winter" bars for excessive falsework settlement
Do not define the type of duct on the plans.	
It is not necessary to show vent details for ducts.	*Standard Specifications* 50-1.07
Precast girders: Required intermediate and end diaphragms shall be placed at least 5 days before deck.	Std. Plan BO-5, Deck Placing Notes
Provide minimum stirrups of 8 @ 12" at all supports and anchor ends.	*Bridge Design Details*, p. 14-12
Show concrete strength limits. See *Bridge Design Details*, pages 9-22 and 9-23.	*Bridge Design Details*, pp. 9-22 & 9-23

	Reference/Commentary
Detailing, *continued*	
Curved girder reinforcing. See Memo to Designers 11-30.	Memo to Designers 11-30; *Bridge Design Details*, p. 1-17.1
Prestressing Notes – Cast-In-Place Girders	*Bridge Design Details*, p. 1-17.1 *Bridge Design Details*, p. 9-21.3
Prestressed I-Girder Stirrup Anchorage	*Bridge Design Details*, p. 14-15
Camber Diagram – Suggest using BDS plot command to produce camber diagram.	*Bridge Design Details*, pp. 9-21.2 & 14-13
For cast-in-place prestressed girder spans involving hinges, place a note near camber diagram giving reaction at the hinge for the suspended span under full dead load plus initial prestress force.	Aids construction in falsework calculations
For simple span structures provide a minimum upward camber of 0.01 ft. per 10 ft. of span length.	
Path of center of gravity of prestressing force.	*Bridge Design Details*, p. 9-21 & 9-21.1
Estimating	
Method of calculating weight of prestressing steel — ignore weight of anchorages.	*Bridge Design Aids*, p. 11-72
Estimate girder stems as having no flare unless extra width is specifically dimensioned.	

Shop Plans	Reference/Commentary
Read Memo to Designers 11-1, Special Provisions and Standard Specifications.	Memo to Designers 11-1; *Standard Specifications*, Section 50
Anchorages must be tested and approved by Transportation Laboratory. If in doubt contact Prestress Committee.	*Standard Specifications* 50-1.06
Advise Documents Unit if more than one RR is involved.	
Allowable variation of force between adjacent girders in ratio of 3 to 2. Maximum variation 725 kips.	Memo to Designers 11-1

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